

SPECIFICATIONS

Maximum Continuous Power:	500 watts
High Surge Peak:	1000 watts
Input Voltage:	12.5 volts
Output Voltage:	120 volts
Output Wave Form:	Modified Sine Wave
Powers Up To:	4.2 amps
USB:	5VDC, 500mA

PI500CP



500 Watt DC to AC Power Inverter



USER'S MANUAL & WARRANTY INFORMATION

IMPORTANT SAFETY INFORMATION, SAVE THESE INSTRUCTIONS

TO REDUCE THE RISK OF INJURY, USER MUST READ AND UNDERSTAND THIS INSTRUCTIONAL MANUAL. THIS MANUAL CONTAINS IMPORTANT INFORMATION REGARDING THE OPERATION AND WARRANTY OF THIS PRODUCT. PLEASE RETAIN FOR FUTURE REFERENCE.

4140 S.W. 30th Ave., Ft. Lauderdale, FL 33312

Toll Free: (800) 54-HOW-TO

POWER ON BOARD 2 YEAR LIMITED WARRANTY PROGRAM

This limited warranty program is the only one that applies to this product, and it sets forth all the responsibilities of Power On Board, regarding this product. There is no other warranty, other than those described herein.

This Power On Board product is warranted, to the original purchaser only, to be free of defects in materials and workmanship for two years from the date of purchase without additional charge. The warranty does not extend to subsequent purchasers or users. Power On Board will not be responsible for any amount of damage in excess of the retail purchase price of the product under any circumstances. Incidental and consequential damages are specifically excluded from coverage under this warranty.

This product is not intended for commercial use. This warranty does not apply to accessories or damage to units from misuse or incorrect installation. Misuse includes wiring or connecting to improper polarity power sources.

RETURN/REPAIR POLICY: Defective products, other than accessories, may be returned to Power On Board. Any defective product, other than accessories, that is returned to Power On Board within 30 days of the date of purchase will be replaced free of charge. If such a product is returned more than 30 days but less than two years from the purchase date, Power On Board will repair the unit or, at its option, replace it free of charge.

If the unit is repaired, new or reconditioned replacement parts may be used, at Power On Board's option. A unit may be replaced with a new or reconditioned unit of the same or comparable design. The repaired or replaced unit will then be warranted under the terms of the remainder of the warranty period. The customer is responsible for the shipping charges on all returned items after 30 days. During the warranty period, Power On Board will be responsible for the return shipping charges.

LIMITATIONS: This warranty does not cover accessories, bulbs, fuses and batteries, defects resulting from normal wear and tear (including chips, scratches, abrasions, discoloration or fading due to usage or exposure to sunlight), accidents, damage during shipping to our service facility, alterations, unauthorized use or repair, neglect, misuse, abuse, failure to follow instructions for care and maintenance, fire, flood and Acts of God.

If your problem is not covered by this warranty, call our Technical Support Department toll free at (800) 54-HOW-TO for general repair information and charges if applicable.

STATE LAW RIGHTS: This warranty gives you specific legal rights. Some states do not allow limitations on how long an implied warranty lasts or the exclusion or limitation of incidental or consequential damages, so the exclusions or limitations stated herein may not apply. This warranty gives the purchaser specific legal rights; other rights, which vary from state to state, may apply.

TO REQUEST WARRANTY SERVICE FOR THIS PRODUCT: Contact Technical Support by telephone, fax or mail. We suggest that you keep the original packaging in case you need to ship the unit. When returning a product, include your name, address, phone number, dated sales receipt (or copy) and a description of the reason for return and product serial number. After repairing or replacing the unit, we will make every effort to return it to you within four weeks.

WARRANTY ACTIVATION: Please complete Warranty Activation Card and mail to Power On Board. Enter "PI500CP" as Model and "500 Watt Power Inverter" as Product Type. All Power On Board products must be registered within 30 days of purchase to activate this warranty. Mail the completed registration form, along with a copy of the original sales receipt to:

BLACK & DECKER
4409 W. Wanda, McAllen, TX 78503
• TOLL FREE: (800)-54-HOW-TO • FAX: (956) 630-0492 •

WARRANTY IS NON-TRANSFERABLE AND NON-REFUNDABLE.

RD010807

IMPORTANT SAFETY INSTRUCTIONS**WARNINGS****TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK, EXPLOSION OR INJURY:**

- Do not connect to AC distribution wiring.
- Remove appliance plug from outlet strip or turn off inverter before working on the appliance. Multiple outlet power strips with switches and circuit breakers only interrupt power to the "hot" receptacle terminals. The "neutral" terminals remain powered with respect to the "ground" terminals.
- NOT approved for ignition protected areas. Do not make any electrical connections or disconnections in areas designated as IGNITION PROTECTED.
- This is not a toy — keep away from children.
- This equipment employs components that tend to produce arcs or sparks. DO NOT install in compartments containing batteries or flammable materials.
- Use this unit in properly ventilated areas ONLY.
- Do not open — there are no user-serviceable parts inside.
- Do not insert foreign objects into the outlet.
- Do not expose the unit to water, rain or snow.

CAUTIONS

- Always inspect battery supply connections and cables to ensure they are tight and that cable insulation is not damaged.
- Do not use with positive ground electrical systems*. Reverse polarity connection will result in a blown fuse and may cause permanent damage to the inverter and will void warranty.
*The majority of modern automobiles, RVs, trucks and boats are negative ground.
- This inverter will not operate high wattage appliances or equipment that produce heat, such as hair dryers, microwave ovens and toasters.
- Grounding the Neutral will cause the inverter to shut down. Do not operate this inverter if it is wet. Do not install in engine compartment — install in a well ventilated area.
- This inverter has not been tested for use with medical devices.
- Do not attempt to install or operate this unit while operating a motor vehicle.

FOR USAGE ABOVE 100 WATTS:

- Use battery clips ONLY.
- DO NOT use the DC accessory plug or the fuse will open.

Important Cable Information

Substantial power loss and reduced battery operating time results from inverters installed with cables that are not able to supply full power. Symptoms of low battery power can result from cables that are either excessively long or an insufficient gauge. Marine installations are also subjected to vibration and stresses that exceed those of other mobile installations. Therefore, the installer/operator should be especially aware of the requirements to maintain secure, tight, water-resistant electrical connections and to provide for strain relief for DC cables and appliance wiring. Cable insulation must be the appropriate type for the environment.

Read This User's Manual Before Using This Power Inverter.

SAVE THESE INSTRUCTIONS

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INTRODUCTION

Your new **Power On Board® 500 Watt Power Inverter** is one in a series of the most advanced DC to AC inverters available today. With proper care and appropriate usage, the inverter will give you years of dependable service.

The Power Inverter supplies 500 watts of continuous power, in the form of two household-type outlets that are ready to deliver 120 volt AC power whenever and wherever you need it. The power inverter has enough power to operate almost any household or electric appliance, including color TVs (up to 20") TV/VCR combinations, DVD/CD players, laptop computers, camcorders, cellular phones, power tool chargers, lamps and more.

The power inverter comes equipped with battery clips to handle higher amperage/load applications. Added safety features include automatic shutdown to prevent damage to your source battery.

This power inverter incorporates a new cooling technology that cools the power transistors and increases the reliability and life of the inverter.

HOW THIS INVERTER WORKS

The power inverter converts low voltage DC (direct current) from a battery or other power source to standard 120 volt AC (alternating current) household power.

Principle of Operation

The inverter converts power in two stages. The first stage is a DC to DC conversion process that raises the low voltage DC at the inverter input to 145 volts DC. The second stage is the actual inverter stage that converts the high voltage DC current into 120 volts, 60 Hz AC current.

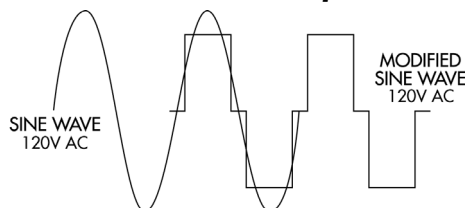
The DC-to-DC converter stage uses modern high frequency power conversion techniques that have replaced the bulky transformers found in less technologically-advanced models. The inverter stage uses advanced power MOSFET transistors in a full bridge configuration. This ensures excellent overload capacity and the ability to operate reactive loads, such as lamp ballasts and small induction motors.

The Power Inverter Output Waveform

The AC output waveform of the Power Inverter is known as “modified sine wave.” It is a waveform that has characteristics similar to the sine wave shape of utility power. This type of waveform is suitable for most AC loads, including linear and switching power supplies used in electronic equipment, transformers, and motors.

The modified sine wave produced by the Power Inverter has an RMS (root mean square) voltage of 120 volts, which is the same as standard household power. Most AC voltmeters (both digital and analog) are sensitive to the average value of the waveform rather than the RMS value. They are calibrated for RMS voltage under the assumption that the waveform measured will be a pure sine wave. These meters will not read the RMS voltage of a modified sine wave correctly. They will read about 20 to 30 volts low when measuring the output of the inverter. For accurate measurement of the output voltage of this unit, use a true RMS reading voltmeter such as a Fluke 87, Fluke 8060A, Fluke 77/99 series, Beckman 4410, or Triplet 4200.

Modified Sine Wave and Sine Wave Comparison



PROTECTIVE FEATURES OF THE INVERTER

The Power Inverter monitors the following potentially hazardous conditions:

Low Battery Voltage — This condition is not harmful to the inverter, but could damage the power source. The Power Inverter automatically shuts down when input voltage drops to 10.5 volts $\pm$.3 volt. When the condition is corrected, the inverter should be turned off, then turned back on.

Over Voltage Protection — The Power Inverter will automatically shutdown when the input voltage exceeds 15.5 volts DC $\pm$.5 volt DC.

Ground Fault Protection — The Power Inverter will automatically shutdown when ground leakage current is detected.

Short Circuit Protection — Reverse polarity or short circuit condition may cause external or internal fuses to open and may cause irreversible damage to the Power Inverter. Take extra care to ensure a proper polarity hook-up.

Overload Protection — The unit will automatically shut down when the continuous draw exceeds the unit's rated output. Reduce load and manually reset using the inverter's ON/OFF switch.

Over Temperature Protection — If the temperature inside the Power Inverter is too high, the unit will automatically shut down. Allow the unit to cool for at least 15 minutes before restarting after a heat-related shutdown. Unplug unit while cooling.

INSTALLATION AND OPERATING INSTRUCTIONS

Power Source Requirements

The power source must provide a nominal voltage of 12.5 volts DC and must be able to supply the necessary current to operate the load. The power source may be a battery or a well-regulated DC power supply. To obtain a rough estimate of the current (in amperes) the power source must deliver, simply divide the power consumption of the load (in watts AC) by 10.

Example: If a load is rated at 500 watts AC, the power source must be able to deliver: 500 divided by 10 = 50 amperes

CAUTION

The Power Inverter must be connected only to batteries with a nominal output voltage of 12 volts. The unit will not operate from a 6 volt battery and will sustain permanent damage if connected to a 24 volt battery.

Connection to Power Source

The Power Inverter comes equipped with a DC accessory outlet plug and battery clip cables for connection to a power source.

Connecting to a Power Source Using the Accessory Outlet Plug

The DC accessory outlet plug is suitable for operating the inverter at power outputs up to 100 watts. The tip of the plug is POSITIVE (+) and the side contact is NEGATIVE (-).

Connect the inverter to the power source by inserting the DC accessory outlet plug firmly into the accessory outlet of a vehicle or other DC power source.

CAUTIONS

- **Connect directly to power source when operating above 100 watts.**
- **Do not use with positive ground electrical systems.**
- **Reverse polarity connection will result in a blown fuse and may cause permanent damage to the inverter.**

Notes: Most vehicle accessory outlet circuits have fuses rated at 15 to 20 amps or greater. To operate at full wattage, either use the battery clip cable (supplied) or directly wire to the power source with user-supplied wire and fuse. The majority of modern automobiles, RVs and trucks are negative ground.

Connecting to a Power Source Using the Provided Cables

Use the provided cables and connect the Power Inverter directly to the 12 volt power source as follows:

1. Make sure the Power Inverter power is turned OFF and that no flammable fumes are present in the installation area.
2. Connect the RED cable to the RED post marked (+) on the back of the inverter. Connect the battery clip to the POSITIVE terminal of the battery.
3. Connect the BLACK cable to the BLACK post marked (-) on the back of the inverter. Connect the battery clip to the NEGATIVE terminal of the battery.
4. Make sure that all connections between battery clips and terminals are secure.

Direct Hardwiring to Power Source

Use #10 AWG wire if the inverter to power source connection is 10 feet or less. for longer cable lengths use #8 AWG wire. In either case, protect the positive (+) wire from shorts by installing a 50 amp fuse or circuit breaker close to the DC power source (battery) terminal.

1. Check to be sure the inverter's power switch is turned OFF and that no flammable fumes are present.
2. Identify the POSITIVE (+) and NEGATIVE (–) DC power source (battery) terminals.
3. Install a fuse holder or breaker close to the POSITIVE (+) terminal of the DC source (battery).
4. Connect a length of wire on one side of the fuse holder or circuit breaker. Connect the other end of the wire to the POSITIVE (+) terminal of the inverter.
5. Connect a length of wire between the inverter's NEGATIVE (–) terminal and the DC power source NEGATIVE (–) terminal.
6. Connect a short length of wire to the other terminal of the fuse holder or circuit breaker. Mark it "POSITIVE" or "+".
7. Connect the free end of the fuse or breaker wire to the POSITIVE (+) terminal of the DC power source (battery).
8. Insert a fuse appropriate to the inverter in the fuse holder.
9. Test the inverter by turning it on and plugging in a 100 watt lamp or equipment.
10. If the inverter is not properly operating, then refer to the Troubleshooting section of this manual.

⚠ CAUTIONS

- **Loose connectors may cause overheated wires and melted insulation.**
- **Check to make sure you have not reversed the polarity. Damage due to reversed polarity is not covered by our warranty.**

Connection To Load

The Power Inverter is equipped with dual standard North American three-prong type outlets. Plug the cord from the equipment you wish to operate into the AC outlet(s). Make sure the combined load requirement of your equipment does not exceed 500 watts.

The Power Inverter is engineered to be connected directly to standard electrical and electronic equipment in the manner described above. Do not connect the Power Inverter to household or RV AC distribution wiring. Do not connect the Power Inverter to any AC load circuit in which the neutral conductor is connected to ground (earth) or to the NEGATIVE of the DC (battery) source.

⚠ WARNING

Do not connect to AC distribution wiring!

⚠ CAUTION

Rechargeable Appliances – Certain Rechargeable devices are designed to be recharged by plugging them directly into an AC outlet. These devices may damage the inverter. Do not use the inverter to recharge items that can be plugged directly into an AC outlet.

This problem does not occur with the majority of battery-operated equipment. Most of these devices use a separate charger or transformer that is plugged into an AC outlet. This inverter is easily capable of operating most chargers and transformers.

Placement of the Inverter

For best operating results, the inverter should be placed on a flat surface, such as the ground, car floor or seat, or other solid surface. A power cord has been provided for easy positioning of the inverter. The inverter should only be used in locations that meet the following criteria:

DRY – Do not allow water and/or other liquids to come into contact with the inverter.

COOL – Ambient air temperature should be between 30°F (–1°C) non-condensing and 105°F (40°C). Do not place the inverter on or near a heating vent or any piece of equipment that is generating heat above room temperature. Keep the inverter away from direct sunlight, if at all possible.

VENTILATED – Keep the area surrounding the inverter clear to ensure free air circulation around the unit. Do not place items on or over the inverter during operation. A fan is helpful if the inverter is operating at maximum power outputs for extended periods of time. The unit will restart after it cools.

SAFE – Do not use the inverter near flammable materials or in any locations that may accumulate flammable fumes or gases.

Operating Tips

Rated Versus Actual Current Draw of Equipment

Most electrical tools, appliances and audio/video equipment have labels that indicate the power consumption in amps or watts. Be sure the power consumption of the item you wish to operate is rated at 500 watts or less. (If the power consumption is rated in amps AC, multiply by the AC volts (110) to determine the wattage).

The inverter has overload protection, so it is safe to try to operate equipment rated at 500 watts or less. The inverter will shut down if it is overloaded.

Resistive loads are the easiest for the inverter to operate. However, large resistive loads, such as electric stoves or heaters usually require more wattage than this inverter can deliver on a continuous basis. Inductive loads, such as TVs and stereos require more current to operate than do resistive loads of the same wattage rating.

Induction motors as well as some televisions, may require two to six times their wattage rating to start up. The most demanding in this category are those that start under load, such as compressors and pumps.

Testing is the only definitive way to determine whether a specific load can be started and how long it can run.

⚠ CAUTION

This inverter will not operate high wattage appliances or equipment that produces heat, such as hair dryers, microwave ovens, or toasters.

Battery Operating Time

An operating time of 2 to 3 hours can be expected from a typical vehicle battery. In most instances, 5 to 10 hours of operating time is achievable. However, the manufacturer recommends that the operator start the vehicle every 2 to 3 hours to recharge the vehicle's battery system. This will guard against any unexpected shutdown of the equipment and will ensure there is always sufficient battery capacity to start the vehicle's engine. The inverter will shut down when DC voltage drops below 10.6 volts.

The inverter may be used whether or not the vehicle's engine is running. However, the inverter may not operate while the engine is starting, since the battery voltage can drop substantially during cranking.

The inverter draws less than 0.5 ampere from the battery when it is not supplying power to a load. In most instances, the inverter can be left connected to the battery when not in use, since it draws so little current. However, if the vehicle is to remain unused for several days, disconnect the inverter from the battery.

Operation of the USB Power Port

1. Position the inverter for use, observing all cautions and warnings in the "Important Safety Instructions" section at the front of this manual.
2. Connect the 12 Volt DC Accessory Cord's small rectangular plug to the inverter's 12 Volt DC Power Port.
3. Insert the other end of the 12 Volt DC Accessory Cord into a vehicle's accessory outlet or other 12 volt DC power source.
4. Rotate the vehicle accessory plug slightly to make sure there is good contact.
5. If the inverter does not work, make sure the ignition/accessory outlet is powering the accessory outlet. Some vehicles require the ignition switch to be turned on.
6. Plug the USB-powered device into the inverter's USB Power Port and operate normally.

Notes: *This inverter's USB Power Port does not support data communication. It only provides 5 volts/500mA (maximum) DC power to an external USB-powered device.*

USB power output is controlled by the ON/OFF Power Switch.

CARE AND MAINTENANCE

Storage

1. Ideal storage temperature range is 50-68°F (10-20°C).
2. Store and use the inverter in a cool, dry place with adequate ventilation.
3. Avoid locations that are exposed to heating units, radiators, direct sunlight or excessive humidity or dampness.

Maintenance

This unit contains no user-serviceable parts. It is recommended that the unit be returned to manufacturer for service (see the Warranty for repair/replacement policy and contact information).

TROUBLESHOOTING

Common Audio/Visual Problems

"Buzzing" sound in audio systems

Some inexpensive stereo systems and "boom boxes" emit a buzzing sound from their speakers when operated from the Power Inverter. This occurs because the power supply in the electronic device does not adequately filter the modified sine wave produced by the inverter. The only solution to this problem is to use a higher quality sound system that incorporates a higher quality power amplified supply.

Television Interference

The Inverter is shielded to minimize interference with TV signals. However, in some instances, some interference may still be visible, particularly with weak TV signals. Try the following corrective measures:

- Position the inverter as far as possible from the television, the antenna and the antenna cables. Use an extension cable, if necessary.
- Adjust the orientation of the inverter, the antenna cables and the TV power cord to minimize interference.
- Make sure that the antenna feeding the television provides an adequate ("snow free") signal and that high quality, shielded antenna cable is used.

Fault Protection Code and Troubleshooting Guide

INVERTER POWER SWITCH TURNED ON

Trouble/Indication	Possible Cause	Suggested Remedy
No AC output — green LED flashes	DC input is out of range	Recharge or replace the battery.
	Excessive load — thermal shutdown	Turn unit off. Reduce the load, wait for the inverter to cool down, then turn the unit on again.
	Fault condition from AC short circuit	Disconnect appliance and clear wiring.
Motorized power tool will not start	Excessive start-up load	If appliance does not start, appliance is drawing excessive voltage and will not work with inverter.
Motorized power tool does not operate at correct speed	Purely inductive load	Make the load not purely inductive (i.e., operate an incandescent lamp at the same time as motor).
Television/radio interference	Snow in picture, "buzzing" sound	Keep inverter and antenna distant from each other. Use shielded antenna. Connect antenna to amplifier.